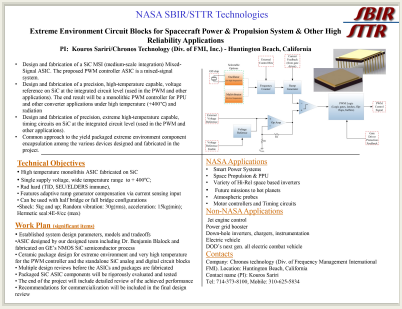
Small Business Innovation Research/Small Business Tech Transfer

Extreme Environment Circuit Blocks for Spacecraft Power & Propulsion System & Other High Reliability Applications, Phase II

Completed Technology Project (2014 - 2017)

Project Introduction

Chronos Technology (DIv of FMI, Inc.) proposes to design, fabricate, and deliver a performance proven, and commercially available set of extreme high operating temperature PWM controller and circuit blocks (EXTEC1). These rad-hard (TID, SEU, ELDERS) components are intended to be used in a variety of spacecraft power and propulsion systems (PPU) along with smart power sub-assemblies for a wide range of both manned and unmanned space missions and payloads. The resulting devices would meet and exceed the required performance under extreme environment, high temperature while being offered commercially in very light, small and rugged package sizes and footprints. The described performance would be superior to any present-day alternatives that may only be available at much lower operating temperatures with no provisions for radiation hardness. The proposed range of circuit blocks that will be fabricated in Silicon Carbide (SiC) technology includes monolithic Pulse Width Modulator (PWM) controller as well as basic circuit blocks such as logic gate(s), counter(s), multivibrator, ramp generator, voltage reference, oscillator, buffer(s) and driver circuits. Logically and synergistically, many of the aforementioned circuit blocks would be used in the integrated PWM design.The significant points of innovation that we propose to bring to realization are: 1-Design and fabrication of a SiC MSI (medium-scale integration) Mixed-Signal ASIC. The proposed PWM controller ASIC is a mixed-signal system. 2-Design and fabrication of a precision, high-temperature capable, voltage reference on SiC at the integrated circuit level (used in the PWM and other applications). 3-Design and fabrication of precision, extreme high-temperature capable, timing circuits on SiC at the integrated circuit level (used in the PWM and other applications). 4-Common approach to the yield packaged extreme environment component encapsulation among the various devices designed and fabricated in the project


NASA SBIR/STTR Technologies

Extreme Environment Circuit Blocks for Spacecraft Power & Propulsion System & Other High Reliability Applications

PI: Kourus Sarirí/Chronos Technology (DIv. of FMI, Inc.) - Huntington Beach, California

Technical Objectives

Work Plan (significant items)

NASA Applications

Non-NASA Applications

Contacts

Extreme Environment Circuit Blocks for Spacecraft Power & Propulsion System & Other High Reliability Applications, Phase II

Table of Contents

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Responsible Program:

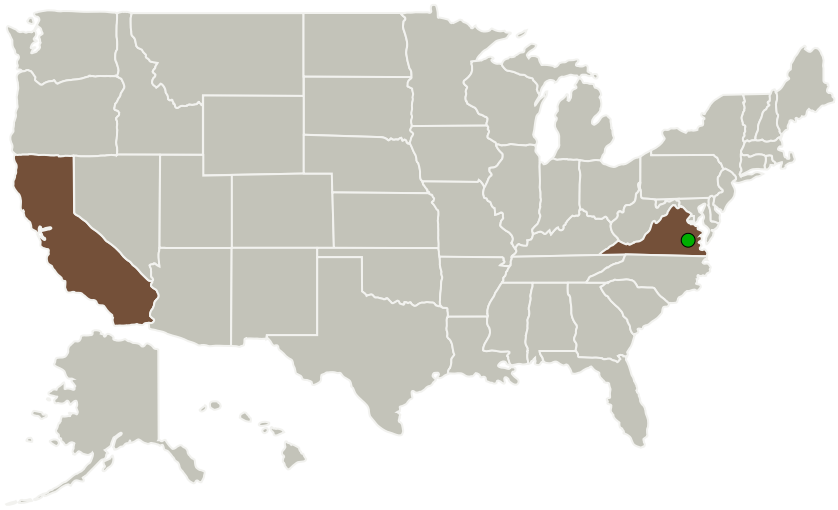
Small Business Innovation Research/Small Business Tech Transfer

Small Business Innovation Research/Small Business Tech Transfer

Extreme Environment Circuit Blocks for Spacecraft Power & Propulsion System & Other High Reliability Applications, Phase II

Completed Technology Project (2014 - 2017)

Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
Langley Research Center(LaRC)	Supporting Organization	NASA Center	Hampton, Virginia

Primary U.S. Work Locations	
California	Virginia

Project Management

Program Director:
Jason L Kessler

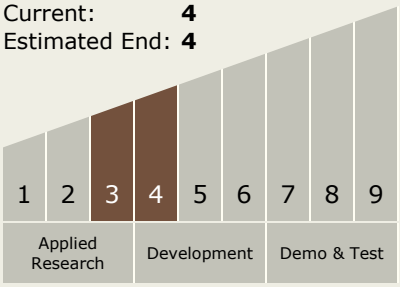
Program Manager:
Carlos Torrez

Principal Investigator:
Kouros - Sariri

Co-Investigator:
Kouros Sariri

Technology Maturity (TRL)

Start: **3**
Current: **4**
Estimated End: **4**



Technology Areas

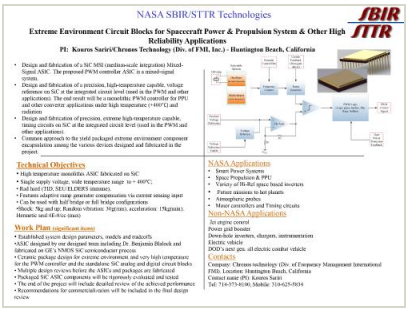
Primary:

- TX01 Propulsion Systems
  - TX01.2 Electric Space Propulsion
    - TX01.2.2 Electrostatic

Extreme Environment Circuit Blocks for Spacecraft Power & Propulsion System & Other High Reliability Applications, Phase II

Completed Technology Project (2014 - 2017)

Images



Briefing Chart Image
Extreme Environment Circuit Blocks for Spacecraft Power & Propulsion System & Other High Reliability Applications, Phase II
(https://techport.nasa.gov/image/131954)

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System